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State of the **COCKROACH** MARKET

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DETECTING COCKROACH PRESENCE

Although half (50%) of the respondents to QA's State of the Industry Report on Cockroach Control reported having never seen a cockroach in or around their food facilities, half had (43%), or may have (7%), seen a cockroach. Of those that had, the most common places for cockroach sightings were in employee areas, such as breakrooms, kitchens, and lockers.

Whether they had ever sighted a cockroach or not, it is reassuring to note that no respondents said they would ignore the pest if seen, rather some would take matters into their own hands, with 55% killing it and 5% applying a pesticide. But the majority – nearly three-quarters of respondents said they or a co-worker would contact a pest control technician (72%) and/or record it in a pest sighting logbook (71%).

According to the 2016 Pest Management Standards for Food Processing & Handling Facilities (<https://bit.ly/2mep6e2>) from the National Pest Management Association (NPMA), that is exactly what should be done. "Each pest management company shall provide a pest sighting log or reporting system to be maintained in a designated area for food facility staff to alert the pest management professional of pests found. The log can include dates, times, locations, type of pest, action taken and name of reporting employee. The log must be reviewed by the technician at each visit and actions taken recorded. The use of the log should be discussed with facility

staff during pest management training performed by the pest management professional or an in-house trainer."

It is, in fact, through employee sightings (85%) and/or logbook entries (57%) that most respondents learn of cockroach presence in their facility, with 78% also having been informed of such presence by a report from the pest service provider. Fewer, though a still significant number (46%), learned of cockroach presence through capture of the pest(s) on a cockroach monitoring trap.

The placement of monitors can be very

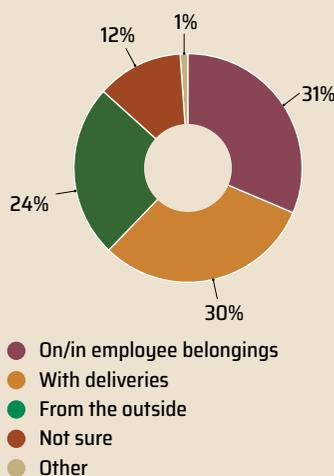
beneficial in cockroach detection and prevention, with even a single cockroach justifying baiting and monitoring efforts, according to the eXtension Foundation. For example, as a prolific breeder, the German cockroach has been implicated in the transmission of several pathogenic organisms and as a cause of allergic reactions, thus requiring prompt detection and control.

It was in fact, the German cockroach which many respondents saw as the greatest threat, with 33% citing this species as being of most concern. Interestingly, the second highest response was that the respondent did not know which species was of greatest concern (26%). This could be interpreted as the respondents not having enough information about the various species, or it could be that no species were of greater or lesser concern than others.

Most cockroach species enter facilities on or in employee belongings or deliveries — a fact understood by many respondents (see graph at left), but these pests can introduce bacterial pathogens as transient microorganisms, eventually becoming resident pathogens if not controlled.

As explained in FDA's draft guidance document for the Human Foods Preventive Controls Rule of the Food Safety Modernization Act (FSMA), "It is important to ensure that these microorganisms remain transient and do not become established in the environment where they can grow and multiply" and potentially "show up in the processing lines and finished product." •

What do you think is the most common way that cockroaches enter food facilities?



Source: Readex Survey 2019; Number of respondents: 213

► THE SURVEY

Sponsored by Zoëcon, QA's 2019 State of the Market: Cockroach Control in Food Facilities survey was conducted by Readex Research, a privately held research firm based in Stillwater, Minn. The January 2019 survey sample of food processing managers

and executives was systematically selected from the circulation file of Quality Assurance & Food Safety (QA). Data was collected from 273 recipients of QA's digital magazine and/or e-newsletter at unique U.S. company locations. Of these, 213 work for a company

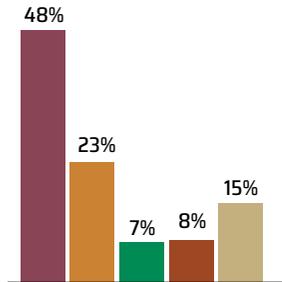
with at least one food facility and are the basis of this report. The margin of error for percentages is ±6.5 percentage points at the 95% confidence level. Specific results may not add up to 100% due to rounding or the ability to select multiple responses.

PROFILE OF SURVEY RESPONDENTS

Source: Readex Survey 2019; Number of respondents: 213

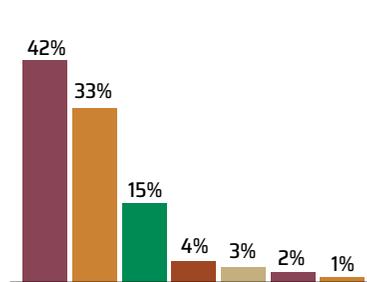
Where they work

- Food/beverage processor
- Ingredient supplier/packaging
- Food service/retail
- Consulting firm/service
- Other (including biotech, university)



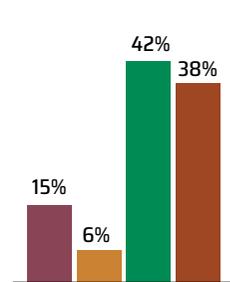
What they do

- Quality control/assurance
- Food safety
- Corporate management
- Sanitarian
- Plant manager
- Pest management
- Other



Their company size

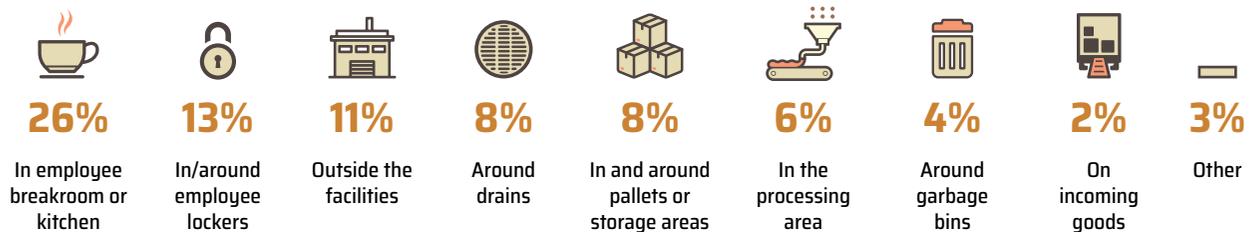
- 20 or more facilities
- 10 - 19 facilities
- 2 - 9 facilities
- 1 facility



WHERE COCKROACHES HAVE BEEN SEEN

(multiple responses could be selected)

Source: Readex Survey 2019; Number of respondents: 91 (those who have seen cockroaches in/around their facility)



COMMON COCKROACHES OF THE U.S.



The cockroach species that infest a food processing facility will vary by geographic location, but the most common cockroach pests of the U.S. are:

- **German Cockroach (*Blattella germanica*):** About 1/2 inch long; light brown with two dark brown stripes behind its head. The most common and serious food facility species, it favors warm, moist areas close to food and water. With the female carrying her 40+-egg capsule throughout gestation to protect it, populations can explode quickly. Its small size

enables it to infest tiny spaces in employee and storage areas as well as production equipment and walls.

- **American cockroach (*Periplaneta americana*):** About 2 inches long; reddish-brown with pale yellow bands around the shield behind its head. The next most common food plant-infesting cockroach, it is the largest encountered indoors. It requires warm, humid environments, and it is most commonly found in steam tunnels, sewer lines, and drains.

- **Oriental cockroach (*Blattella orientalis*):** About 1 1/4 inches long; glossy, dark brown or black. Because it is more cold-tolerant, this cockroach prefers to inhabit cool, dark, and damp places. It generally is found outdoors, but it will enter facilities, especially during dry seasons.

- **Brown-banded cockroach (*Supella longipalpa*):** About 1/2 inch long, brown with two light yellow-brown bands running across its body. With a preference for warm, dry areas, it requires

less water than other species and will feed on virtually anything, including non-food materials. While it can be found throughout structures, preferring hiding places up off the floor, this species is less common in food facilities.

- **Invading outdoor species** can commonly include smoky brown cockroaches which may be attracted to food plant areas with decaying organic material, and Asian cockroaches which may enter near well-lit areas when doors are left open.

A SMALL PEST with BIG COSTS



PEST EXCLUSION: IT'S THE LAW

With the current Good Manufacturing Practices (cGMPs) having become regulation with the passage of FSMA, its pest control provisions (21 CFR Part 117.35(c)) are no longer simply good practice, they are the law.

Thus, by regulation: "Effective measures must be taken to exclude pests from the manufacturing, processing, packing, and holding areas and to protect against the contamination of food on the premises by pests."

Food facilities are being held to the law, as the following violations included in FDA Warning Letters attest:

- **AT A BAKERY:** Failure to take effective measures to exclude pests from the processing areas and protect against the contamination of food, including: 15 "dead apparent brown cockroaches" and approximately 80 "apparent cockroach excreta pellets."
- **IN A FOOD WAREHOUSE:** "FDA investigators observed the following evidence of insect and rodent activity ... Three apparent dead cockroaches were observed on a white sticky trap in the Southwest corner of the building along the west wall."
- **THE CLASSIFICATION OF AN AIRLINE CATERING/PROCESSING FACILITY** was changed from "Approved" to "Provisional" for significant cGMP violations that included failure "to exclude pests from your food plant (including) evidence of apparent cockroach activity and lack of effective measures to exclude cockroaches and other pests from the manufacturing and processing areas was observed. One apparent live cockroach ... in the hot production kitchen and one apparent live cockroach ... in the dishwashing room. ... Dead apparent nymph and adult cockroaches too numerous to count ... in the hot preparation kitchen."



Whether discussing the cockroach's ability to contaminate food, rapidly reproduce, cause inspection/audit citation, be of customer concern, or spread disease, this small pest is of significant concern to food facility managers and executives. In fact, such concerns averaged 3.72 on a scale of one to five, of which five was very concerned. Specifically, food facilities expressed concern or high concern about cockroach:

1	2	3	4	5
FOOD CONTAMINATION	RAPID REPRODUCTION	INSPECTION/AUDIT CITATION	CUSTOMER CONCERN	DISEASE SPREAD
70%	68%	65%	61%	51%

The food industry is right to be concerned. A cockroach in a food facility is a:

- 1. Contamination Source.** Bacteria can survive in a cockroach's digestive system for months or years, then be expelled as it defecates along its travel path and spews saliva to "taste" its environment. In addition to such bacterial contamination, its droppings and bodily secretions can stain and leave an odor that permeates packaging.
- 2. Reproductive Nightmare.** Cockroaches often harbor and breed in spaces and voids where normal cleaning and sanitizing methods do not reach. Unseen, they can multiply quickly, with one female cockroach and her offspring theoretically able to produce hundreds of thousands of cockroaches in a single year.
- 3. CGMP Violation.** Failure to exclude pests and protect against contamination of food constitutes a violation in a regulatory inspection or third-party audit. The observation of even a single live cockroach can elicit an FDA Warning Letter. (See *Pest Exclusion: It's the Law* at right.)
- 4. Reputation Risk.** A consumer discovering a cockroach in your product or a food-borne illness outbreak traced to your company can damage your reputation and cause considerable financial loss. And in today's social media-dominant world, a single incident can be spread across the Internet before you are even informed of its existence.
- 5. Public Health Pest.** Cockroaches have been documented as physically carrying foodborne disease bacteria, including *Salmonella*, *Listeria*, and *Campylobacter* on their bodies to contaminate product surfaces on which they tread. Their droppings and shed skins contain allergens, so heavy populations can trigger asthma attacks in susceptible individuals and be carried on air currents into sensitive areas. •

PREVENTIVE MEASURES REDUCE CONCERN

With the concerns that food facility managers and executives have about cockroaches, what are they doing for prevention?

Practices to prevent cockroaches are implemented by 92% of the respondents with the primary methods cited as being regular inspections (77%) and/or insect monitoring (69%). While both are significant detection methods, they also provide prevention against infestation by ensuring that steps are taken at the first sign of cockroach entry. Because the processing facility cannot completely prevent cockroaches from being carried in on employees' belongings or stowing away in supplies, inspection and monitoring can provide an important first step in preventing a single gravid cockroach from building into an infestation. In addition to these preventive measures, 41% of respondents applied residual pesticides in approved areas, or had them applied by their pest control operator.

Fewer respondents, however, implemented any exclusion

methods against cockroach entry, with 61% stating that they did not include exclusion as a preventive pest practice.

As shown at right, of those who did implement exclusion practices, the primary methods were the sealing of cracks and gaps, instructing employees to keep doors closed, and installing door sweeps or air doors. Additionally, only slightly fewer cut back branches and shrubbery from the building to reduce pest access.

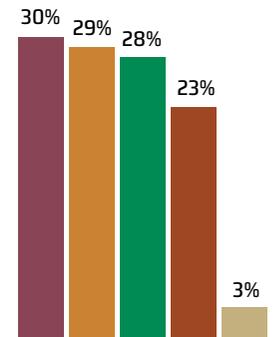
Once inside, cockroaches can easily move from employee, dock, and other less-sensitive areas of a facility through cracks, gaps, and doorways to the food-processing and storage areas. Thus, adapting exclusion practices recommended by the University of Florida Extension Service (<https://bit.ly/2GpTK23>) to food facilities can be of significant benefit:

1 Cockroaches can migrate easily throughout buildings and from neighboring multi-unit operations. Sealing gaps (e.g., around plumbing, wall outlets, and switch plates) will help prevent cockroaches

from migrating from infested areas.

2 Keep doors and windows closed and screened; caulk cracks and gaps that may allow cockroaches to invade from outdoors.

3 Cockroaches frequently enter through dry or dirty drain traps. "American cockroaches are closely associated with drains and you must inspect them on a regular basis," said Copesan Director of Technical Support and Regulatory Compliance Bennett Jordan. "Keep drains clean, using a stiff brush on occasion, to reach places where liquid cleaners don't flow. If a drain is no longer in use, have it prop-



Source: Readex Survey 2019; Number of respondents: 64 (those who use exclusion)

erly excluded so cockroaches can't use it as a thoroughfare, but it can still be opened for inspection."

4 To prevent invasion on incoming goods which may have been stored in infested supplier locations, inspect all shipments for cockroach signs and presence (live or dead cockroaches, cast skins, fecal stains, etc.). Reject shipments as applicable.

5 Visitors and employees can transport cockroaches from infested homes on themselves or in packages. Limit visitor access to specific areas, keep employee areas clean, and regularly inspect all areas. •





OUTSOURCED VS. INTERNAL SERVICE

According to the survey, the vast majority of food facilities (95%) use an external provider for at least some of their pest control services, with 21% of those doing some of their pest control in-house. It's no surprise that outsourcing pest control services tends to be more expensive as illustrated by the fact:

- 25% of those who outsourced their service spent more than \$5,000 each month on pest control and 35% spent \$1,000 to \$4,999.
- Of those whose pest control efforts were completely internal, only 9% spent more than \$1,000 per month on materials and chemicals, while more than half (58%) spent less than \$100.

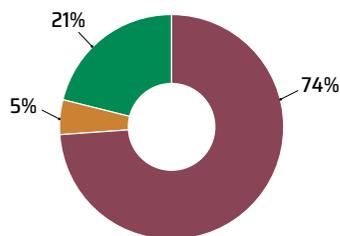
There also are differences in the level of influence managers and executives have over the pesticides used in the facility depending on whether service is outsourced or conducted internally, but that difference is not as significant as one may expect. In fact, while none of those who outsourced their service actually purchased the pesticides, 86% influenced or made the decision on the pesticides to be used.

Interestingly, while 13% of respondents with internal service were the pesticide buyer and 77% either influenced or made the decision on the product to be purchased, the percent of those with no influence over the pesticide purchased was very similar between those with internal service (11%) and those who outsourced (14%).

Whether conducted in-house or outsourced, the programs seem to be working, as 92% of respondents feel that their facility's cockroach control programs have been successful and the money well spent. •

Who provides your facility's pest control services?

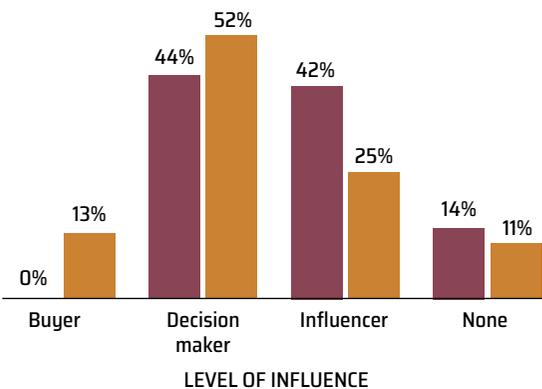
- Pest control company only
- Internal employee(s)/department only
- Both — internal/pest control company



Source: Readex Survey 2019; Number of respondents: 213

PESTICIDE PURCHASING POWER

- External/Both
- Internal Only



Source: Readex Survey 2019; Number of respondents: 202 external/both, 56 internal only

IPM TODAY. IPP TOMORROW.

As defined by EPA, IPM is an environmentally friendly, common-sense approach to controlling pests that uses pesticides only as needed — providing a more effective, environmentally sensitive approach. While IPM limits pesticides, the logical next step may be an Integrated Pest Prevention (IPP) program. IPM integrates multiple methods based on site information obtained through inspection, monitoring, and reports. While each program should be customized to the facility, EPA notes a successful IPM program as involving:

1. Inspection and Identification. A facility inspection and correct identification of any pests is necessary to determine needed preventive and control measures and reduce pesticide use.

2. Prevention. IPM focuses on prevention by removing conditions that attract pests, such as food, water, and shelter. Prevention includes such methods as sealing of areas where pests can enter, maintaining a sanitary interior and exterior environment, removing standing water, and educating employees.

3. Control. IPM programs use the most effective, lowest risk options considering all risks such as trapping, physical removal, and/or judicious pesticide application. A record of services and pesticide applications should be maintained to include evidence that non-chemical methods were considered and implemented, along with any recommendations for corrective action.

TIPS FOR CONTROLLING COCKROACHES

What do successful companies do to control cockroaches? With all respondents stating that they have pest control service at their food facility, it is interesting to note the differences in frequency of service which varies among food facilities from daily (2%) to weekly (62%) to monthly (32%) or more.

For a percentage of respondents, however, that service does not include any control methods *specifically* focused on cockroaches inside (25%) or outside (36%). Of those who did, the most frequently used interior methods were traps (37%) and bait (38%). Around the exterior, most common were a perimeter spray (34%) and/or bait (22%). Baits were used both inside and outside structures, with some survey respondents also using insect growth regulators (IGRs) to manage cockroach populations.

But most did not simply rely on service. Rather, 84% of respondents fully or somewhat implement Integrated Pest Management (IPM) in their programs. If properly and fully applied, IPM can help prevent and control all pests, regardless of the type. (See *IPM Today, IPP Tomorrow*, page 6.)

As previously noted, cockroach sticky traps can be used for monitoring and prevention as well as for control. “Use pest monitors in warm and/or moist areas to detect the early stages of an

Cockroach Control Methods Used:

METHOD	INTERIOR	EXTERIOR
Traps	37%	*
Perimeter spray	*	34%
Bait	38%	22%
Residual	25%	*
Granules	*	13%
Repellents	11%	10%
Insect Growth Regulators	11%	2%
Other	10%	2%
None	25%	36%

*not listed as option

Source: Readex Survey 2019; Number of respondents: 213, multiple responses possible

infestation,” Copesan’s Bennett Jordan said. “If cockroaches are detected, contact your pest control provider immediately to identify the species and recommend appropriate control measures. A cockroach problem is easier (and less expensive) to control if detected early.”

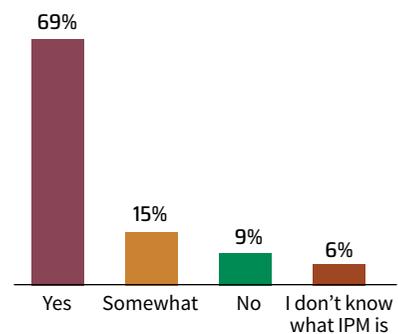
Overall, the methods used by respondents include:

- Perimeter sprays, applied around the foundation of the facility, are a common method of control and prevention, as they provide a barrier against the entry of exterior pests.
- Applicable to both exterior and interior use (where approved), cockroach baits

combine a food attractant with a slow-acting insecticide. A cockroach will eat the bait then crawl back to its harborage where it may share the feast with other cockroaches or cause secondary poisonings as they consume its toxic feces.

- Residual, granular, and repellent insecticides are all used by a number of responding food facilities. These can provide good cockroach control when implemented in a thorough IPM program.
- While used by a modest percentage of respondents, insect growth regulators (IGRs) can effectively break the cockroach life cycle and provide months of control. These can be particularly beneficial when used in conjunction with a baiting program. •

Does Your Facility Implement IPM?



Source: Readex Survey 2019; Number of respondents: 213

4. Monitoring. Any pest activity and the efficacy of the prevention and control methods should be continually monitored, with records kept of monitoring locations, inspection schedule, results, findings, and recommendations for prevention. IPM plans should be updated as needed.

TOMORROW’S IPP. “While IPM is a key component of today’s pest control programs, perhaps the logical next step is to consider moving toward an Integrated Pest Prevention program,” said ASC Consulting President Al St.Cyr.

Integrated Pest Prevention is similar to IPM, he said, “But the action takes place before the pest is introduced to the facility, instead

of taking place as a result of pest activity.”

As such, IPP involves scientific knowledge of the biology and behavior of pests combined with a comprehensive understanding of the environmental conditions that are present or likely. From these factors, the facility develops a strategy to prevent pests from developing.

IPP relies on every participant understanding and executing their roles; and success is based on verification, vigilance, and cooperation.

“It won’t be long before it will no longer be an acceptable practice to react to a pest population with control and management techniques *after* their presence is detected,” St.Cyr said. •

IT'S TIME TO TALK ABOUT THE BIRDS AND THE BEES AND IGRs.



COMPARISON CHART	HYDROPRENE (GENTROL®)	PYRIPROXYFEN	NOVALURON
• Broad spectrum control includes cockroaches, drain and fruit flies, and bed bugs	✓		
• Translocates to reach pest harborages	✓		
• Increases gel bait consumption in adult female cockroaches and nymphs	✓		
• Low odor and non-repellent	✓	✓	✓
• Long-lasting residual activity	✓	✓	✓
• Use in food and non-food areas	✓	✓	✓

KILL CALLBACKS BY PREVENTING FUTURE GENERATIONS.



A LEGACY OF CONTROL.

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